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## Description

This application is related to the subject matter of US-A-4,831,927, issued May 23, 1989, entitled "Printing Press Dampener", the disclosure of which is incorporated herein by reference.

This invention relates to offset lithographic printing presses having a spray rail and series of spray nozzles for supplying dampening fluid to the press during printing operations. More particularly, this invention relates to an improved spray rail that creates a more even spray pattern over the dampener of a printing press for improved quality of prints, by introducing air into the dampener solution prior to exit through the spray nozzles.

Lithography is the art or process of printing from a flat stone or metal plate. Lithography is distinguished from other forms of printing, in part, by the absence of relief to distinguish between the areas to be printed and those to be left blank. The lithographic method is based upon the repulsion between immiscible liquids, such as oil-based inks, and water. The process begins by the etching of a design on a surface. A grease-like material that is attracted to the etched area is then applied to the surface. The greased areas of the surface repel water ensuring that only ungreased areas of the surface become saturated with water. The printing ink subsequently applied will be repelled by the ungreased areas that are saturated with water and absorbed by the greased areas. This creates the design in ink on the surface.

To ensure that printing ink is not absorbed in areas that are ungreased, and thereby improve the quality of the print, a continuous supply of water must be uniformly applied to the press during the printing operation. If water is not evenly applied, stripes occur in the blank portions of the printed article. This is known as striping and can be experienced to varying degrees depending upon the uniformity of the water coverage. The more uniform the application of water, therefore, the better the quality of the resulting print.

To reduce the variations in the film of water applied to the printing plate, water is not applied directly to the plate. Instead, water is first applied to a dampener or roller and subsequently transferred to the printing plate. Although some of the irregularities in coverage can be removed by indirect application of water to the printing plate, the uniformity in water coverage on the printing plate and consequent quality of print can be further enhanced by achieving a uniform water film on the dampener or roller itself.

Various means of applying water to the dampener have been utilized in attempts to improve the uniformity of the water covering on the dampener. These include partially immersing the dampener in

a fountain and the utilization of the action of flicker brushes to coat the dampener with water. Many of these however have proved to be erratic in their achievement of uniformity.

The use of a spray rail comprising a series of spray nozzles to spray fluid onto a dampener has proved quite successful. The spray pattern achieved, although fairly uniform, does result in some variation in the fluid coverage achieved. Over long periods of time, the spray nozzles are prone to clogging. The blockages created may merely reduce the uniformity in spray coverage and therefore the quality of a print. Alternatively, the blockages may completely block the exit of fluid from the spray nozzle creating large areas of dark striping on the final print. When the nozzles are completely blocked, the press must be stopped for cleaning of the nozzles. The frequent stoppages necessary to clean the nozzles reduces operating efficiency. It is desirable therefore to be able to consistently apply a uniform film of water to the printing plate so that prints of higher quality can be consistently achieved. For this reason it is also desirable that nozzle clogging be reduced.

The printing press dampener of this invention applies a water film of improved uniformity to the printing press by improving the uniformity of the spray emitted from the spray rail and reducing the likelihood of blockage. This is achieved by introducing air into the water spray prior to exit through the spray nozzles.

In US-A-4 241 656 a spray bar for supplying dampening fluid to a lithographic printing system is disclosed. A plurality of nozzles are positioned on the spray bar to which are connected an air conduit and at least one liquid transmitting conduit. The spray bar further includes air supply bores and a liquid supply bore formed therein and communicating respectively with the air conduit and the liquid conduit. The liquid bore includes an extension of the liquid conduit therein for communicating directly with a liquid duct of a nozzle. The liquid duct is defined by a tubular member. The termination of the tubular member is an inwardly projecting flange defining a small orifice of a liquid nozzle. An air expansion chamber communicating with the air supply bores surrounds the tubular member defining the liquid duct. The air expansion chamber includes an end wall having a relatively large orifice opposite to the smaller orifice of the tubular member. The air is mixed with the liquid downstream the liquid orifice of the tubular member in a mixing corridor between the termination of the tubular member defining the liquid duct and the opposite end wall of the air chamber surrounding the tubular member.

Accordingly it is an object of this invention to provide an improved printing press dampener that

meets the aforementioned needs.

It is a specific object of this invention to provide a printing press dampener that consistently applies a more uniform film of water to the press plate.

It is a further object of this invention to provide a printing press dampener that is less prone to clogging.

It is another object of this invention to provide an improved spray rail printing press dampener that enables the same area of coverage of the dampener to be achieved by the spray nozzles with lower fluid pressure.

In accordance with one embodiment of this invention an improved printing press dampener which achieves the foregoing objects includes an elongated body member having a first and a second passage provided therein. The first passage is connected to a supply of dampening fluid and the second passage is connected to a supply of pressurized gas. A plurality of chambers are disposed along the length of the elongated body member and are in communication with both the first and the second passages. Fluid, including both water and gas, are mixed within these chambers. A plurality of spray nozzles, one in communication with each of the chambers, are positioned to spray dampening fluid against the dampener of the offset printing press. The mixing chamber is preferably a valve chamber having a valve preferably of the solenoid valve type. The dampener fluid and pressurized gas are preferably introduced separately to opposite sides of the valve body for mixing.

For a more complete understanding of this invention, reference should now be made to the embodiment illustrated in greater detail in the accompanying drawings and described by way of example only. In the drawings:

Figure 1 is a perspective view of printing press dampener.

Figure 2 is a sectional view through the printing press dampener of Figure 1 at a spray nozzle.

Figure 3 is a sectional view through the printing press dampener of Figure 1 in a direction transverse to that of Figure 2.

Turning to Figure 1, a perspective view of a printing press dampener spray rail can be seen. An elongated rail 1 has fluid passages 2 and 3 provided for connection to a supply of pressurized dampening fluid and pressurized air, respectively, from a supply of air and of dampening fluid (not shown). A plurality of spray nozzles 4 are disposed along the length of the elongated rail 1. The nozzles 4 spray dampening fluid against a dampener roller for transfer onto a press plate. The nozzles 4 may be of any desired type but in this particular embodiment are solenoid operated valves. Each solenoid operator is connected to a source of elec-

trical power by means of electrical connections that enter the rear portion of the rail 1 as through an opening 5 indicated on Figure 1 of the drawings. Spray shields 10, 11 confine the spray from the nozzles and extend across the entire breadth of the rail 1.

Figures 2 and 3 show more clearly the solenoid valve and the manner in which pressurized air and dampening fluid are mixed in the valve chamber 12 for expulsion through the spray nozzle 4. The pressurized air and the pressurized dampener fluid enter the solenoid valve separately from opposite sides of the valve body 16 through passages 13 and 14, respectively. When the solenoid valves 15 are turned on, the dampener fluid and air mix in the solenoid valve chamber 12. The fluid/air mixture then passes through the orifice 20 of the valve and sprays at the spray nozzles 4.

By mixing air with the dampener solution a more evenly distributed fluid spray pattern is obtained from the spray nozzle. This results in reduced striping in the finished print and thereby improves quality. The pressurized air passing through the narrow orifice 20 helps to keep the spray nozzle clean and thus reduces clogging. Clogging at a spray nozzle can prevent the spray rail from adequately covering the dampener with fluid causing prints to be of inferior quality. By reducing the likelihood of clogging, the down-time of the press is reduced, enabling the printing process to be accomplished more efficiently.

A further advantage over existing spray rail dampeners is achieved by the use of solenoid valves with larger diameter nozzles that, as a result of the additional air pressure, can be utilized at lower flow rates of dampener fluid. By using a larger nozzle diameter, a greater area of fluid coverage can be achieved at a lower flow rate. In such a nozzle, the pressurized air causes the dampening fluid to fan to give this effect. To obtain the optimum spray pattern it is preferable to hold the pressure in the air to  $13,79 \cdot 10^3$  Pa (2 psi) below that of the pressure in the dampening solution. The pressures of the two supplies are preferably both between  $2,1 \cdot 10^5$  Pa and  $2,8 \cdot 10^5$  Pa (30 and 40 psi).

## Claims

1. A spray rail (1) for supplying dampening fluid to an offset printing press having a dampener roller, comprising:

an elongated body member disposed adjacent said dampener roller, said body member having a first passage (2) provided therein for connection to a supply of dampening fluid and a second passage (3) provided therein for connection to a supply of pressurized gas;

a plurality of chambers (12) in communication with said first and second passages (2, 3), each of said chambers (12) operatively connected for mixing dampening fluid from said first passage (2) with pressurized gas from said second passage (3); and

a spray nozzle (4) in communication with each of said chambers (12) for spraying dampening fluid against the dampener roller, characterized in that each of said chambers (12) is provided in the valve body (16) of a valve (15) associated with each spray nozzle (4) and disposed upstream thereof.

2. The spray rail (1) of claim 1 wherein said gas and dampening fluid enter said valve chamber (12) from opposite sides of said valve body (16). 15
3. The spray rail (1) of claim 1 or 2 wherein said valve (15) is a solenoid valve. 20
4. A spray rail (1) of any one of the preceding claims, characterized in that a plurality of valve chambers (12) and a plurality of spray nozzles (4) are each disposed along the length of said elongated body member of the spray rail (1). 25
5. The spray rail of any one of the preceding claims wherein said gas is air. 30

#### Patentansprüche

1. Sprühschiene (1) zur Versorgung einer Offsetdruckpresse, die eine Befeuchtungswalze aufweist, mit Befeuchtungsflüssigkeit, enthaltend: einen angrenzend an die Befeuchtungswalze angeordneten langgestreckten Körper, in dem ein erster Durchlaß (2) zum Anschluß an eine Befeuchtungsflüssigkeitsquelle und ein zweiter Durchlaß (3) zum Anschluß an eine Druckgasquelle vorgesehen sind, mehrere Kammern (12), die mit dem ersten und dem zweiten Durchlaß (2, 3) in Verbindung stehen, wobei jede der Kammern (12) so angeschlossen ist, daß eine Vermischung von Befeuchtungsflüssigkeit aus dem ersten Durchlaß (2) mit Druckgas aus dem zweiten Durchlaß (3) bewirkt wird, und eine Sprühdüse (4), die mit jeder der Kammern (12) in Verbindung steht, um Befeuchtungsflüssigkeit gegen die Befeuchtungswalze zu sprühen, dadurch gekennzeichnet, daß jede der Kammern (12) in dem Ventilkörper (16) eines Ventils (15) vorgesehen ist, das mit jeder Sprühdüse (4) in Verbindung steht und stromaufwärts von diesen angeordnet ist. 35 40 45 50 55

2. Sprühschiene (1) nach Anspruch 1, worin das Gas und die Befeuchtungsflüssigkeit von einander gegenüberliegenden Seiten des Ventilkörpers (16) in die Ventilkammer (12) eintreten.
3. Sprühschiene (1) nach Anspruch 1 oder 2, worin das Ventil (15) ein Magnetventil ist.
4. Sprühschiene (1) nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß entlang der Länge des langgestreckten Körpers der Sprühschiene (1) mehrere Ventilkammern (12) und mehrere Sprühdüsen (4) angeordnet sind.
5. Sprühschiene nach einem der vorangehenden Ansprüche, worin das Gas Luft ist.

#### Revendications

1. Banc de pulvérisation (1) pour alimenter en fluide de mouillage une presse d'imprimerie offset ayant un rouleau de mouillage, comprenant:
  - un corps allongé disposé de façon à être adjacent audit rouleau de mouillage, ledit corps allongé étant doté d'un premier passage intérieur (2) pour former une liaison avec une alimentation en fluide de mouillage et d'un deuxième passage intérieur (3) pour former une liaison avec une alimentation en gaz sous pression;
  - plusieurs chambres (12) en communication avec lesdits premier et deuxième passages (2, 3), chaque chambre (12) étant reliée fonctionnellement pour permettre le mélange du fluide de mouillage provenant dudit premier passage (2) avec le gaz sous pression provenant du deuxième passage (3); et
  - un ajutage de pulvérisation (4) communiquant avec chacune desdites chambres (12) pour pulvériser le fluide de mouillage contre le rouleau de mouillage, caractérisé en ce que chaque chambre (12) est prévue dans le corps de clapet (16) d'un clapet (15) associé avec chaque ajutage de pulvérisation (4) et disposé en amont de celui-ci.
2. Banc de pulvérisation (1) conforme à la revendication 1, dans lequel ledit gaz et ledit fluide de mouillage entrent dans ladite chambre à clapet (12) par des côtés opposés du corps dudit clapet (16).

3. Banc de pulvérisation (1) conforme à l'une des revendications 1 ou 2, dans lequel ledit clapet (15) est une électrovanne.

4. Banc de pulvérisation (1) conforme à l'une des revendications précédentes, caractérisé en ce que plusieurs chambres à clapet (12) et plusieurs ajutages de pulvérisation (4) sont disposés chacun le long du corps allongé du banc de pulvérisation (1).

5. Banc de pulvérisation conforme à l'une des revendications précédentes, dans lequel ledit gaz est de l'air.

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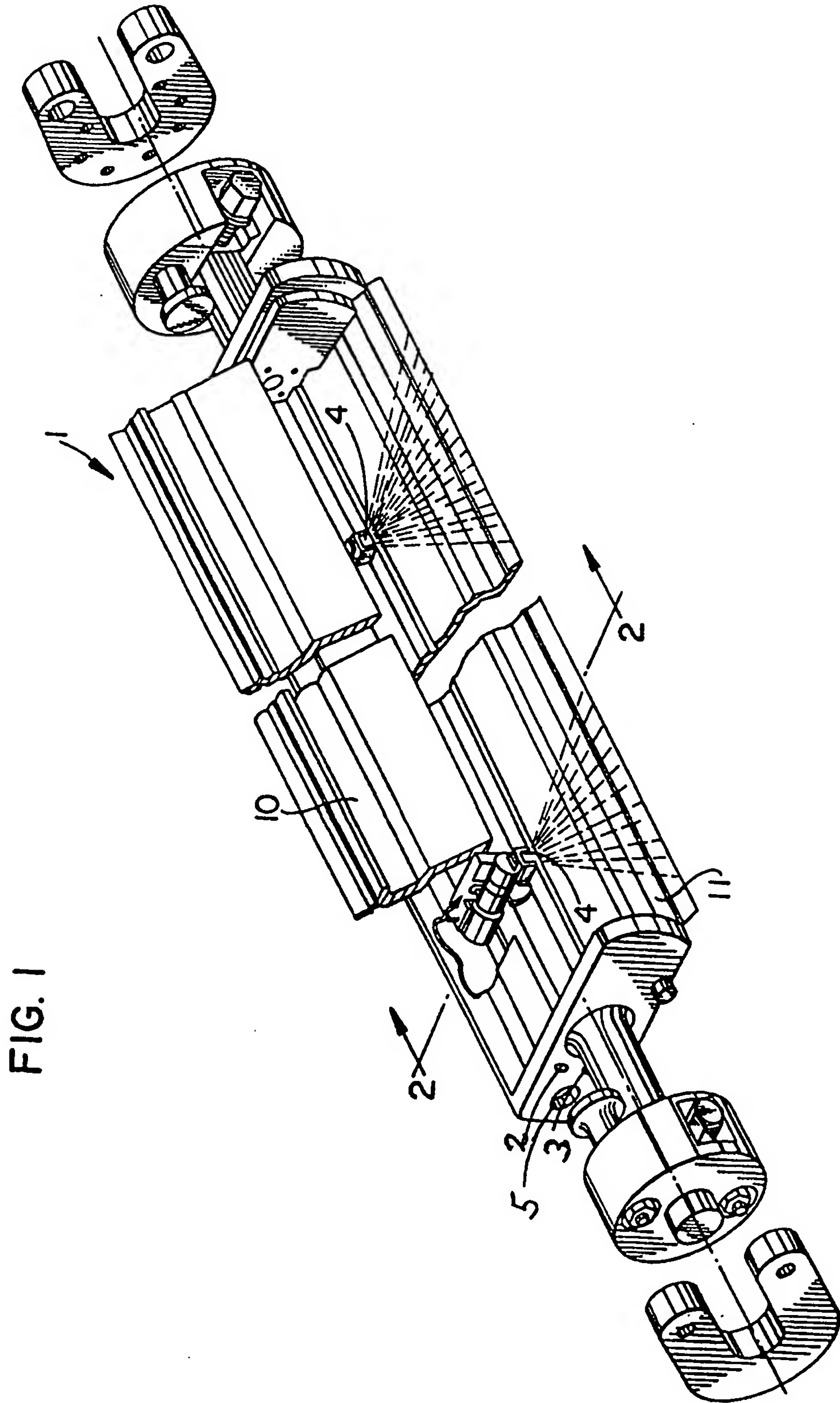


FIG. 1

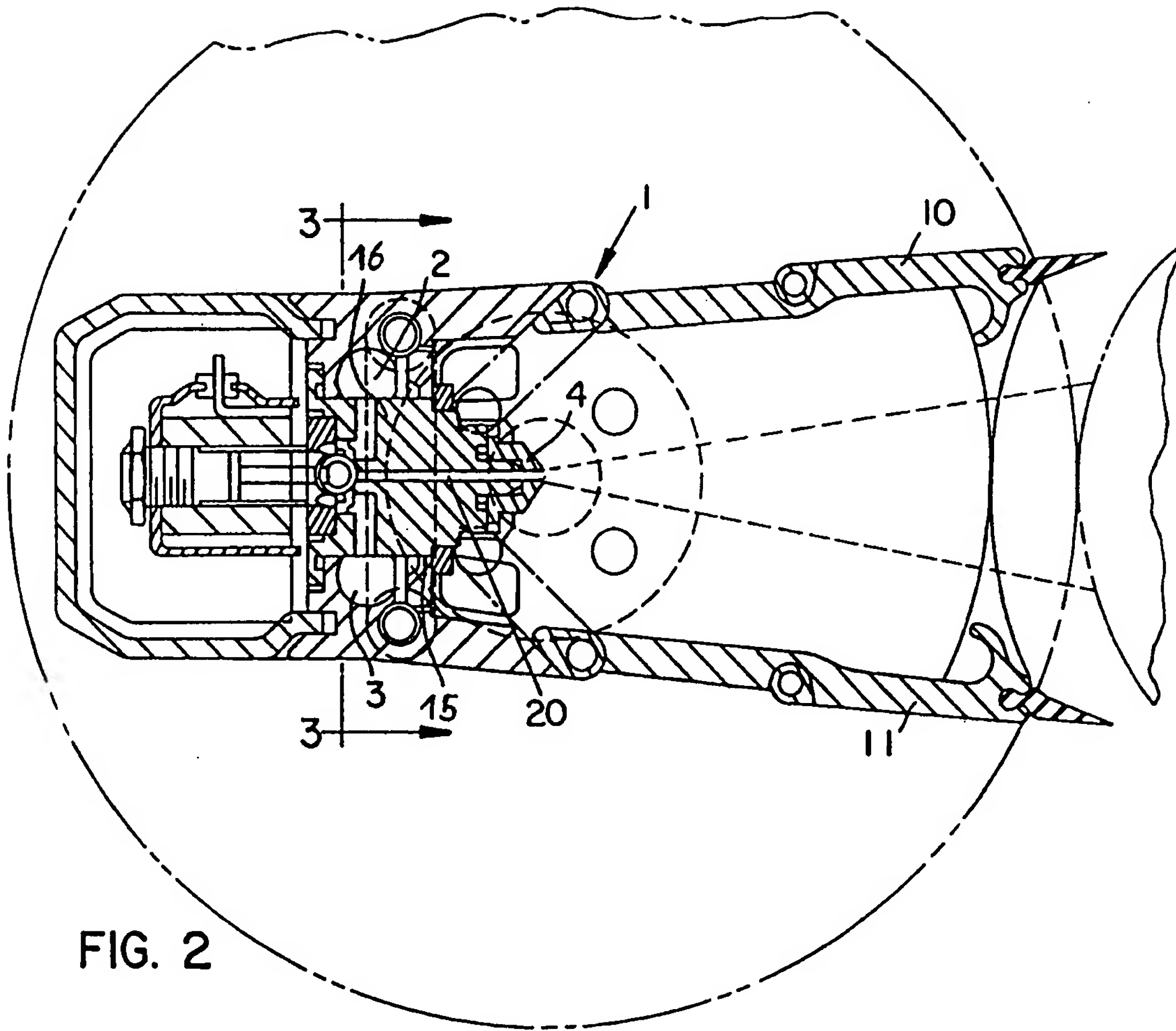


FIG. 3

